

Ammonia Is Our HHC



What is Anhydrous Ammonia?



*Joseph Priestley (1733-1804)
first isolated ammonia in 1774*

- **11.6** on PH Scale
- Highly Attracted to H₂O When mixed called **Aqueous Ammonia** commonly used in Agriculture
- Refrigeration Grade 99.95% pure **Anhydrous** meaning without water

What are some of the benefits of Ammonia?

Fertilizer – About 85% of the ammonia produced is used to create fertilizers.



Cleaner – A very common household cleaner.

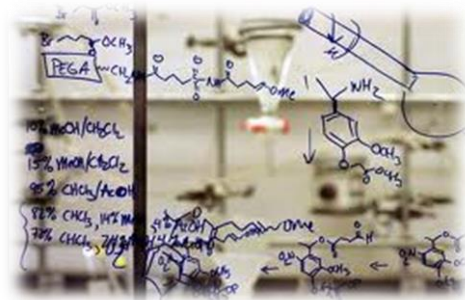


Fermentation – Used as a source of nitrogen for microorganisms and to adjust PH



What are some of the benefits of Ammonia?

Chemistry – Used as a precursor chemical for explosives, dyes, pharmaceuticals, vitamins, cosmetics, plastics, polyurethane, and synthetic fibers such as nylon & rayon.



Water Treatment – In conjunction with chlorine, Ammonia treats fresh water to eliminate bacteria



What are some of the benefits of Ammonia?

Scrubbing Pollution - Used to scrub SO₂ and NO_x from the burning of fossil fuels.



Antimicrobial Agent – Used to prevent spoilage and to improve the protein content.



What are some of the benefits of Ammonia?

Refrigeration – Ammonia is the most commonly used industrial refrigerant



What are some of the benefits of Ammonia?



Ammonia is classified as a Natural Refrigerant!

NO Ozone Depletion Effect



NO Global Warming Effect



Why do we use Ammonia as a Refrigerant?

Ammonia Is A Natural Refrigerant

Ammonia's Scent Is Noticeable At Very Low Concentrations

Ammonia Has Zero Global-warming Potential and No Adverse Effect On The Ozone Layer

Ammonia Has A Low Environmental Impact

Ammonia Does Not Cause Cancer

WHAT HARM CAN AMMONIA CAUSE TO LIVING THINGS?

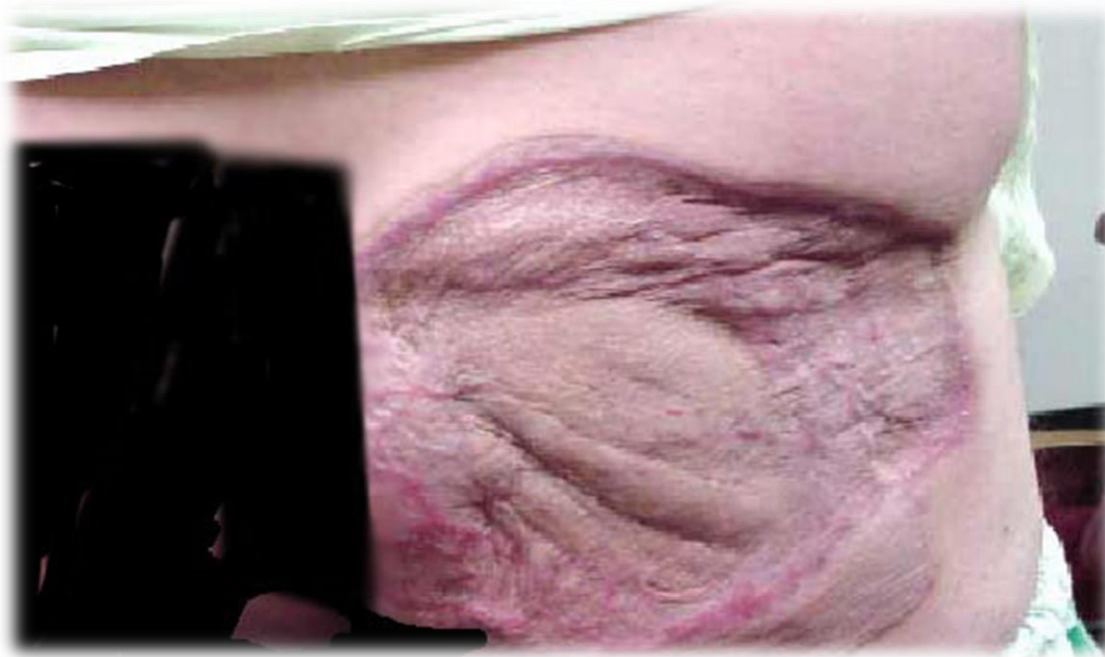
Because it is very cold at atmospheric pressure (-28°F or lower) results in **THERMAL BURNS**



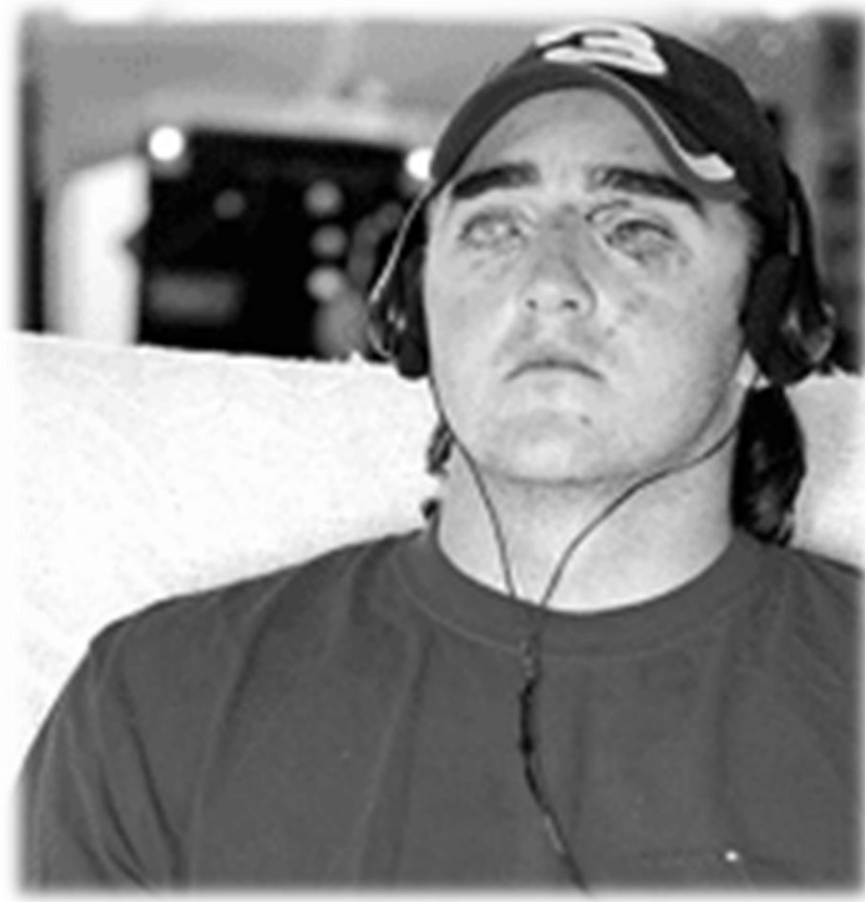
Because it has a high PH it can cause chemical **CAUSTIC BURNS**

WHAT HARM CAN AMMONIA CAUSE TO LIVING THINGS?

Because it readily combines with free water it can cause **TISSUE DAMAGE** through rapid **DEHYDRATION**.



WHAT HARM CAN AMMONIA CAUSE TO LIVING THINGS?



ENVIRONMENTAL HAZARDS

- Most marine life cannot metabolize Ammonia rapidly so additional Ammonia entering their habitat can cause a rapid fish-kill.

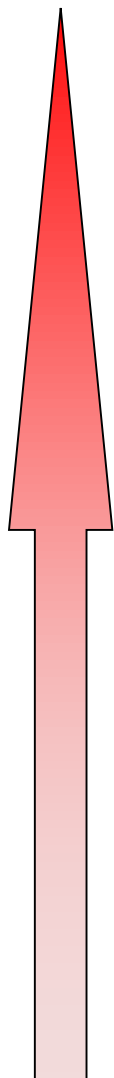


- Plants use ammonia as a fertilizer but in very high concentrations they suffer the same pH burns and dehydration damage that people and animals do.



Anhydrous Ammonia is Used to Make Meth





LEVEL IN PPM	Level in %	Health and Safety Consideration
280,000	28.000000%	Upper Explosive Limit - pure Ammonia will be too rich above this level to burn.
150,000	15.000000%	Lower Explosive Limit - pure Ammonia will be too lean below this level to burn.
30,000	3.000000%	Exposed skin will suffer burns and blisters at this level
10,000	1.000000%	Death will result from lung exposure at this level nearly immediately.
5,000	0.500000%	Death will result from lung exposure at this level in a matter of minutes.
700	0.007000%	Significant irritation to Eyes and Mucus Membranes
300	0.003000%	Immediately Dangerous to Life and Health as set by NIOSH
50	0.000500%	Permissible Exposure Limit as set by OSHA
5	0.000005%	Ammonia vapor can usually be detected by scent.

WHAT HARM CAN AMMONIA CAUSE TO LIVING THINGS?

$\frac{1}{2}$ NH_3 = 5,000 ppm

$\frac{1}{2}$ NH_3 Can Lead To Death
Almost Immediately
Without Proper PPE.



M 14:40:11
06-13-00



PERMISSIBLE EXPOSURE LIMIT / PEL

OSHA Has Defined 50ppm As
The **PEL** for Ammonia In
§1910.1000 Table Z-1.

At Concentrations Of **50ppm**
Or Higher A Worker Must
Wear An Air Purifying
Respirator (APR) Equipped
With Cartridges Suitable For
Use With Ammonia.



IMMEDIATELY DANGEROUS TO LIFE AND HEALTH / IDLH

IDLH Is Defined By **OSHA** In §1910.134(b) As "An Atmosphere That Poses An Immediate Threat To Life, Would Cause Irreversible Adverse Health Effects, Or Would Impair An Individual's Ability To Escape From A Dangerous Atmosphere.

At Concentrations Of **300PPM** Or Higher A Worker **MUST** Wear A Self-contained Breathing Apparatus (**SCBA**)



FLAMABILITY/ EXPLOSIVE LIMITS

- **LEL or Lower Explosive Limit: 15% or 150,000 PPM**
- **UEL or Upper Explosive Limit: 28% or 280,000 PPM**



**On December 12, 1983 A Houston, Texas Ice Cream Plant
Exploded From A Massive Ammonia Leak In The
Facility's Basement.**

29. 9. 94
17:04



Ammonia Fire Diamond

- Health Hazard-Blue 3
- Fire Hazard-Red 1
- Reactivity-Yellow 0
- Specific Hazard-White

*Ammonia Fire Diamond for
Ammonia in Mechanical
Rooms according to
ANSI/IIAR 2-2008
(Addendum A)*



Health 3
Fire 3
Reactivity 0
Special

*Ammonia Fire Diamond for
Pure Ammonia from an
MSDS*



Health 3
Fire 1
Reactivity 0
Special

Department of Transportation (DOT)

- Ammonia has been categorized as a hazardous material



- OSHA requires that employers develop and implement procedures to protect the health and safety of employees involved in emergency response and cleanup of releases of hazardous material CFR 29, 1910-1200

NH₃ ABSORPTION RATE TO H₂O

A Single Gallon Of Water Can Absorb Up To
1300 Times Its Volume In Ammonia Vapor!





Reactions with water

Expansion Rate

Ammonia Liquid Expands Roughly 768:1 When Going From Liquid To Vapor.



This Also Means That A Liquid Release Will Involve Much More Ammonia Than A Vapor Release Under The Same Pressure.



Liquid NH_3 in water

Hydrostatic Expansion



**Trapped Liquid
Ammonia Will
Rise 100-150psi
Per Degree
Fahrenheit Of
Temperature
Rise.**

Does your Company Have a Plan?

More than a 100 lb. release of NH₃ in 24 hours is a reportable release to the following:

- **NRC “National Response Center”**
- **LEPC “Local Emergency Planning Committee”**
- **SERC “State Emergency Response Commission”**
- **EPA Regional Director**

Plus anyone your company or municipality may require

